



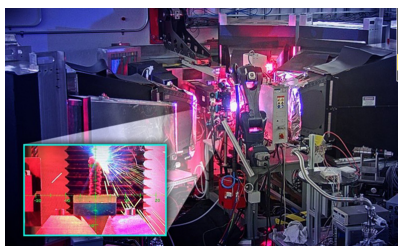
# Laboratory Directed Research and Development

The Laboratory Directed Research and Development (LDRD) at Oak Ridge National Laboratory (ORNL) funds creative and innovative R&D that positions the Lab for the future through strategic investment in research, capabilities, and expertise.

In accordance with US Department of Energy (DOE) requirements, LDRD projects support the following goals:

- Enable agile responses to energy, environmental, and national security challenges
- Advance the frontiers of science, technology, and engineering
- Attract, retain, and develop scientific and technical workforce

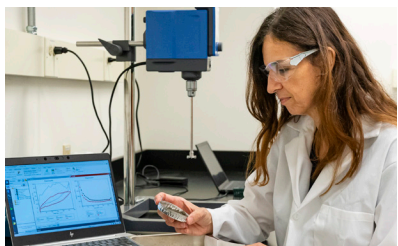
## Mission Agility



Alex Plotkowski and team led the development of a 2023 R&D 100 award-winning platform, OpeN-AM. The platform is used for performing operando neutron diffraction studies of metals during additive manufacturing, also known as 3D printing. OpeN-AM is made up of a deposition head, machining capabilities, and infrared monitoring, which can be coordinated with operando engineering neutron diffraction measurements

at ORNL's Spallation Neutron Source. This combination of capabilities provides unparalleled insight into the evolution of phase transformations and stressors that occur during the AM process, allowing for continued improvement of AM processing and accelerating the development of new materials.

## Advancing Frontiers



Denise Antunes da Silva and team are conducting research to assess the technical and environmental feasibility of using harvested coal ashes to produce alkali-activated binders (AABs), such as fly ash and other coal combustion residues. These AABs can then be used to produce a robust, durable, and low carbon binder for construction in mixtures with water and strong alkali materials. If used to replace Portland cement as a building material, this could reduce the

embodied carbon of construction components by as much as 90%. AABs can also offer a potential safe path to immobilize most of the heavy metals present in the coal ash.

## FY AT-A-GLANCE

181

projects

986

contributors

176

publications

10

patents and  
35 invention  
disclosures

"LDRD investments are enabling us to develop a 'One ORNL' ecosystem that will connect computing, scientific instruments, and edge devices across science domains to facilitate new innovations not possible with current technology."

**Ben Mintz, Co-Lead for the Self-Driven Experiments for Science/  
Interconnected Science Ecosystem (INTERSECT) Initiative**



# Exceptional Scientific and Technical Workforce

The Strategic Hire Program, LDRD Early Career Competition, and Distinguished Staff Fellowships attract and develop a diverse and talented workforce of innovators and problem solvers. Principal investigators in these programs, including over 50 early career scientists and established researchers, represent a broad range of disciplines and research groups spanning the Laboratory's missions.



**Marm Dixit**  
R&D Associate  
Staff Member  
ESTD  
DISTINGUISHED  
STAFF FELLOWSHIP



**John Field**  
R&D Staff Member  
BESSD  
STRATEGIC HIRE



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Staff Member  
ISED  
EARLY CAREER  
COMPETITION



**Yue Yuan**  
Distinguished Staff  
Fellow  
PSD  
DISTINGUISHED  
STAFF FELLOWSHIP

## Funding Opportunities Through LDRD

To help address the Laboratory's strategic objectives, ORNL manages five complementary programs within LDRD.

### Director's R&D Program (DRD)

Develops new capabilities in support of the Laboratory's science and technology initiatives

### Seed Program

Supports innovative ideas that have the potential for enhancing the Laboratory's core scientific and technical capabilities and addresses emerging sponsor priorities and needs

### Strategic Hire Program

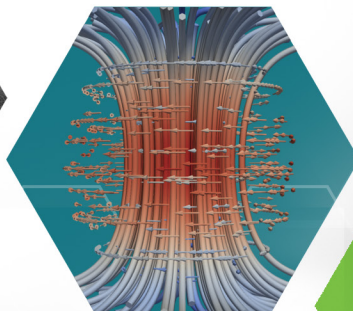
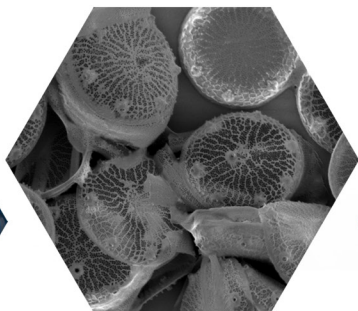
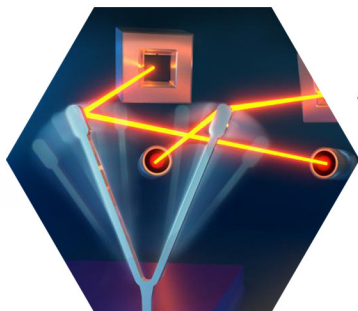
Attracts talent to add critical skills in research areas aligned with ORNL's strategic direction

### Distinguished Staff Fellowship Program

Allows the Laboratory to hire exceptional early-career scientists to expand its scientific and technical expertise and build future scientific leadership

### Early Career Competition

Invests in early-career scientists at ORNL to cultivate new research leadership; awardees receive funding to lead a 2-year project and join the ORNL Early Career Development Program, which focuses on professional training, networking, and exposure to ORNL and DOE elements



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